WHAT IS CLAIMED IS:

1. A method for tracking an object in an image using Fast Fourier Transforms, comprising the steps of:

identifying a background correction term for a Fast Fourier Transform correlation tracker; and

tracking the object based on a representation of the background correction term that includes the frequency domain sinc function.

2. The method of claim 1, wherein the step of tracking comprises the steps of:

zero-padding a reference window to a size of a search window, performing a 2 dimension Fast Fourier Transform of the zero-padded reference window into the frequency domain, and taking a complex conjugate of the transformed zero-padded reference window;

performing a 2 dimension Fast Fourier Transform of a search window;

performing a complex multiplication of the complex conjugate of the transformed zero-padded reference window and the transformed search window, and multiplying the result by a first factor to obtain a first result in the frequency domain;

squaring pixel values of the search window and performing a 2 dimension Fast Fourier Transform of the squared pixel values into the frequency domain;

multiplying the transform of the squared pixel values with a sinc function to obtain a second result in the frequency domain;

summing the first and second results to form a third result in the frequency domain;

performing a 2 dimension inverse Fast Fourier Transform the third result to obtain a spatial-domain correlation surface; and

searching for a minimum of the correlation surface.

3. The method of claim 2, wherein the first factor is -2.

4. The method of claim 2, wherein the sinc function is a 2 dimension sinc function.

5. The method of claim 4, wherein the sinc function is pre-stored.

6. The method of claim 2, wherein in the step of searching for a minimum of the correlation surface, border areas which have edge effect caused by window operation, are excluded.

7. The method of claim 1, wherein the step of tracking comprises the steps of:

zero-padding a reference window to a size of a search window, performing a 2 dimension Fast Fourier Transform of the zero-padded reference window into the frequency domain, and taking a complex conjugate of the transformed zero-padded reference window;

performing a 2 dimension Fast Fourier Transform of a search window;

performing a complex multiplication of the complex conjugate of the transformed zero-padded reference window and the transformed search window, and multiplying the result by a first factor to obtain a first result in the frequency domain;

obtaining a search window function by squaring pixel values of the search window;

performing a 2 dimension Fast Fourier Transform of the search window function into the frequency domain;

multiplying the transform of the search window function with a sinc function to obtain a second result in the frequency domain;

summing the first and second results to form a third result in the frequency domain;

performing a 2 dimension inverse Fast Fourier Transform the third result to obtain a spatial-domain correlation surface; and

searching for a minimum of the correlation surface.

8. A method for tracking an object in an image using Fast Fourier Transforms, comprising the steps of:

transforming non-constant terms of a mean-square-error correlation function from the spatial domain into the frequency domain, wherein one of the non-constant terms is a background correction term and the frequency domain representation of the background correction term includes the 2-dimension sinc function;

computing the non-constant terms in the frequency domain;

transforming the computed non-constant terms from the frequency domain to the spatial domain to obtain a correlation surface;

and evaluating the correlation surface in the spatial domain to find a minimum on the correlation surface, where the location of the minimum corresponds to a location of the object in the image.

9. A method for tracking an object in an image using the first and third terms of a mean-square-error function $C(s,t)$ defined as having three terms, wherein the first term is a background correction term, the method comprising the steps of:

transforming the first and third terms into the frequency domain;

computing the first term in realtime using the 2-dimension sinc function;

computing the third term;

transforming the computed first and third terms out of the frequency domain to form a correlation surface; and

determining a minimum of the correlation surface, wherein a location of the minimum corresponds to a location of the object being tracked.

10. The method of 9, wherein the mean-square-error function $C(s,t)$ is defined as

$$C(s,t) = \frac{1}{N}\sum_{N} f^2(x,y) + \frac{1}{N}\sum_{N} g^2(x-s,y-t) - 2\cdot\frac{1}{N}\sum_{N}\left[f(x,y)\cdot g(x-s,y-t)\right]$$

wherein the first term is

$$\frac{1}{N}\sum_{N} f^2(x,y)$$

and wherein the third term is

$$- 2\cdot\frac{1}{N}\sum_{N}\left[f(x,y)\cdot g(x-s,y-t)\right].$$

11. A Fast Fourier Transform correlation tracker, comprising:

a computing device with inputs for receiving an input search window image and receiving a reference window image, wherein the computing device tracks the reference window image in the input search window image based on a frequency domain background correction term that includes the 2 dimension sinc function.

12. The tracker of claim 11, wherein the tracker

zero-pads a reference window to a size of a search window, performs a 2 dimension Fast Fourier Transform of the zero-padded reference window into the frequency domain, and takes a complex conjugate of the transformed zero-padded reference window;

performs a 2 dimension Fast Fourier Transform of a search window;

performs a complex multiplication of the complex conjugate of the transformed zero-padded reference window and the transformed search window, and multiplying the result by a first factor to obtain a first result in the frequency domain;

squares pixel values of the search window and performs a 2 dimension Fast Fourier Transform of the squared pixel values into the frequency domain;

multiplies the transform of the squared pixel values with a sinc function to obtain a second result in the frequency domain;

sums the first and second results to form a third result in the frequency domain;

performs a 2 dimension inverse Fast Fourier Transform the third result to obtain a spatial-domain correlation surface; and

searches for a minimum of the correlation surface.

13. The tracker of claim 11, wherein the tracker

zero-pads a reference window to a size of a search window, performs a 2 dimension Fast Fourier Transform of the zero-padded reference window into the frequency domain, and takes a complex conjugate of the transformed zero-padded reference window;

performs a 2 dimension Fast Fourier Transform of a search window;

performs a complex multiplication of the complex conjugate of the transformed zero-padded reference window and the transformed search window, and multiplying the result by a first factor to obtain a first result in the frequency domain;

obtains a search window function by squaring pixel values of the search window;

performs a 2 dimension Fast Fourier Transform of the search window function into the frequency domain;

multiplies the transform of the search window function with a sinc function to obtain a second result in the frequency domain;

sums the first and second results to form a third result in the frequency domain;

performs a 2 dimension inverse Fast Fourier Transform the third result to obtain a spatial-domain correlation surface; and

searches for a minimum of the correlation surface.